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United States Patent [19]**Dembo**[11] **Patent Number:** **5,799,287**[45] **Date of Patent:** **Aug. 25, 1998**[54] **METHOD AND APPARATUS FOR OPTIMAL PORTFOLIO REPLICATION**[76] **Inventor:** **Ron S. Dembo**, 822 Richmond St. W., Toronto, Ontario, Canada. MCJ 1C9[21] **Appl. No.:** **866,303**[22] **Filed:** **May 30, 1997****Related U.S. Application Data**

[63] Continuation of Ser. No. 248,042, May 24, 1994, abandoned.

[51] **Int. Cl.⁶** **G06F 157/00**[52] **U.S. Cl.** **705/36**[58] **Field of Search** 705/36, 37, 35; 395/925Wiest, "Portfolio Gains Favor in FX Mangement", *Reuter's BC Cycle*, Apr. 6, 1992.Elgin, "Portfolio Hedging Emerges in New Forms to Shield Investments: Investments and Benefits", *Corporate Cash-flow Magazine*, vol. 11, p. 22.Hansell, "Is the World Ready for Synthetic Equity", *Institutional Investor*, Aug. 1990, p. 54.Voorkees, "Can Portfolio Insurance Make a Comeback", *Institutional Investor*, Jan. 1988, p. 57.Ring, "Wells Fargo Gets Most New Business in Dynamic Wedging", *Pensions & Investment Age*, Feb. 9, 1987, p. 31.Dembo et al., "Tracking Models and the Optimal Regret Distribution in Asset Allocation", *Applied Stochastic Models and Data Analysis*, 1990, vol. 8, pp. 151-157.Dembo, "Scenario Optimization", *Annals of Operation Research*, 30 (1991) pp. 63-80.

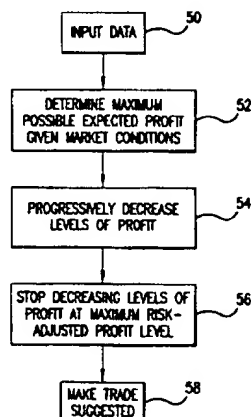
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Attorney, Agent, or Firm—Kenyon & Kenyon[57] **ABSTRACT**

A method and apparatus for determining an optimal replicating portfolio for a given target portfolio involves an initial step wherein a user defines a target portfolio to be replicated, a set of available market instruments from which the replicating portfolio may be created, a set of future scenarios, a horizon date, and a minimum profit to be attained. A representation of the trade-off between risk and expected profit for some arbitrary replicating portfolio is then determined and used to calculate a maximum risk-adjusted profit. The maximum risk-adjusted profit reflects that level of return that may be achieved with an optimum degree of risk; that is, it reflects that point in the risk/reward trade-off where a marginal cost of risk is equivalent to a marginal benefit attainable by assuming that risk. The method then uses the predefined set of available market instruments to identify a set of transactions that will create a replicating portfolio that will achieve the maximum risk-adjusted profit. The method and apparatus also derives the information required to compute a risk premium for pricing of portfolios in incomplete markets, and performs the computation.

12 Claims, 8 Drawing Sheets

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